

## Description

# Method and circuit for sensing the output current of power sources

### BACKGROUND OF INVENTION

- [0001] In some applications, one or more front-end converters are used to generate a regulated voltage that is used as a power source for one or more downstream converters. A sudden change in the output current of the front-end converters will cause the regulated voltage to sag.
- [0002] The voltage sag can be reduced by sensing the output current of the front-end converters and providing this information to the control circuit of the front-end converter.

### PRIOR ART (REF. FIGURE 1)

- [0003] In the prior art, the front-end converter 2 processes power from the input voltage source 1 and creates an intermediate voltage on distribution bus 2.
- [0004] This voltage feeds the downstream converters 5, 6 and 7.
- [0005] The output current of the front-end converter 2 is sensed

by shunt 8. The signal on shunt 8 can be used as an input for the control circuit 3 or for other control or monitoring purposes.

[0006] Although measuring current by means of a shunt is very simple, it has the disadvantage of poor signal-to-noise ratio, excessive power dissipation and sometimes significant cost.

### **SUMMARY OF INVENTION**

[0007] The present invention relies on current sensing devices that are typically present in the downstream converters to generate a signal that is an accurate representation of the output current of the front end converter or converters.

### **BRIEF DESCRIPTION OF DRAWINGS**

[0008] Figure 1 shows the prior art

[0009] Figure 2 shows the preferred embodiment of the present invention

### **DETAILED DESCRIPTION (REF. FIGURE 2)**

[0010] It is the goal of the present invention to eliminate the use of the shunt and to provide a current signal having a high signal-to-noise ratio.

[0011] For many converter topologies, the average input current of the converter is equal to the average current in the

switches or transformers of the converter.

[0012] Virtually all converters contain current sensing means (represented by blocks 9, 10 and 11) that produce a signal proportional to the instantaneous current flowing in their switches or transformer/inductor windings.

[0013] The present invention takes advantage of these facts to allow measurement of the output current provided by the front-end source utilizing elements that are already present in the downstream converters.

[0014] As the output current of the front-end converter is equal to the sum of the average input currents of the downstream converters, by averaging and summing these signals, a signal can be generated that is proportional to the output current of the front-end converter.

[0015] In the preferred embodiment, the signals produced by the current sensing means 9, 10 and 11 located inside the downstream converters 5, 6 and 7 are averaged by the R/C networks 13/12, 15/14, and 17/16 and summed by the adding means 18.

[0016] The resulting signal is proportional to the output current of the front-end converter 2 and can be used for various control and/or monitoring purposes.